ArcelorMittal International
North America

ArcelorMittal

Structural Shapes

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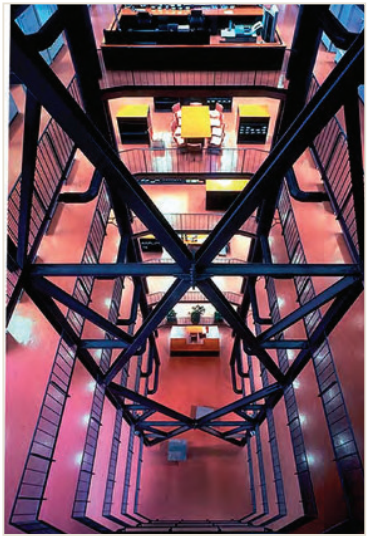
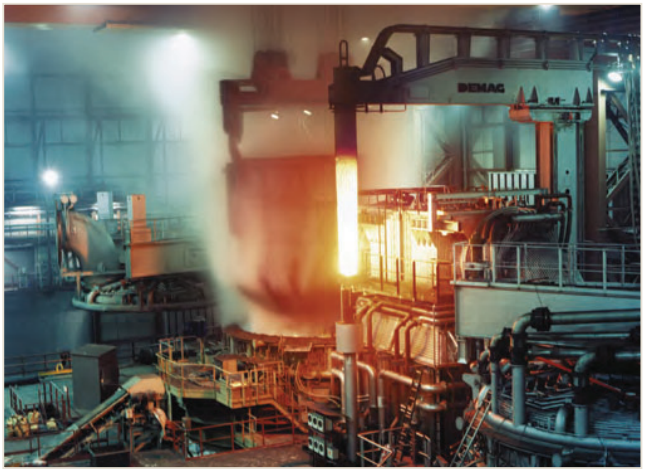
Expert in steel and structural shapes

ArcelorMittal is the world's leading steel and mining company, with a presence in 60 countries and steelmaking facilities in 17 countries. We are driven by a goal to help build a better world with smarter steels. Steels that are cleaner, stronger, and reusable. Steels that emit significantly less carbon, reduce end-use costs, and that are made using innovative processes that minimize energy use. With steel at our core, and drawing on our inventive people and entrepreneurial culture,
we will support the world in making that change.

For the construction industry, ArcelorMittal offers innovative, competitive and sustainable solutions to engineers and fabricators. Our experience in the production of structural shapes is best represented by the history of our Grey mill at ArcelorMittal Differdange.



ArcelorMittal office building (AOB), Luxembourg



Electric arc furnace

Located in Luxembourg, this mill is home to several world firsts in the steel industry. In 1902, we rolled the first parallel wide flange shape and shortly after, in 1911, we produced the first steel section measuring 40 inches (one meter) in depth. This mill also introduced Tailor-Made beams (WTM) in 1979 – profiles that were praised by both structural engineers and fabricators as a cost-effective alternative to built-up sections and concrete. Today, ArcelorMittal's leadership in steel production is demonstrated through our introduction of ASTM A913 Grade 80 and our wide-ranging portfolio of shapes, which includes W14 x 16 sections weighing up to 873 lb/ft, W36 x 16.5 profiles weighing up to 925 lb/ft, and W40 x 16 sections weighing up to 655 lb/ft.

HISTAR®

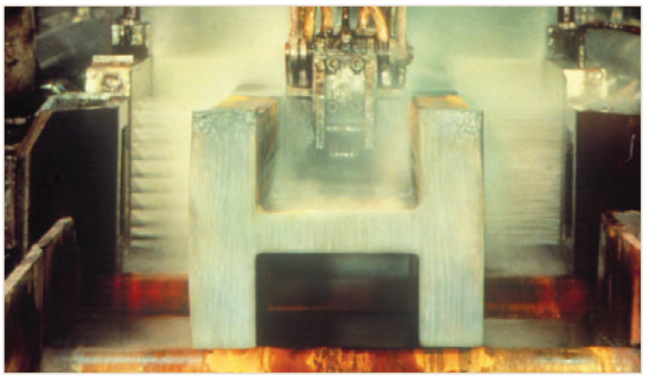
In 1990, ArcelorMittal introduced high-strength, low-alloy HISTAR® steel to the world market. HISTAR® is different from other steel on the market as it is produced using the specialty, in-line Quenching and Self-Tempering (QST) process.

With the development of HISTAR® steel, ArcelorMittal succeeded in creating structural steel that combines high yield strength with excellent toughness and outstanding weldability – material properties that had historically been considered incompatible with fabrication and reduced costs.

W36 X 925 in HISTAR®

W14 x 90 – 132
W14 x 145 – 873
W36 x 150 – 387
W36 x 231 – 925
W40 x 167 – 392
W40 x 199 – 655
W44 x 230 – 408

Popular sizes available in HISTAR®



Rolled section in the QST bank

HISTAR® steel is delivered in accordance with the European Technical Approval ETA 10/156 and is compatible with material standards throughout the world. Hot-rolled I-shaped structural profiles delivered in HISTAR® grades enable the design of innovative structures that have improved efficiency, simplified fabrication and reduced costs.

Material specification: ASTM A913

Conforming to the ASTM A913 specification, which was originally published in 1993, HISTAR® is well recognized in the North American market. The material is available in yield strengths of 50 ksi [345 MPa], 65 ksi [485 MPa], 70 ksi [450 MPa], and 80 ksi [550 MPa] - the highest in the market for structural shapes. In addition, HISTAR®'s toughness characteristics demonstrate good performance in even the most taxing of environmental conditions. Its low-alloy content allows for favorable welding characteristics, in many cases requiring no preheat prior to performing welding procedures.

Chemical requirements*

Element	Maximum content in %		
	Grade 50 [345]	Grade 65 [450]	Grade 70 [485]
carbon	0.12	0.12	0.12
manganese	1.60	1.60	1.60
phosphorus	0.030	0.030	0.030
sulphur	0.030	0.030	0.030
silicon	0.40	0.40	0.40
copper	0.45	0.45	0.45
nickel	0.25	0.25	0.25
chromium	0.25	0.25	0.25
molybdenum	0.07	0.07	0.07
columbium	0.05	0.05	0.05
vanadium	0.06	0.08	0.09

* see page 7 for chemical requirements of Grade 80 [550]

Key material properties

Mechanical Properties
1. Charpy V-notch tests shall be made in accordance with Specification A673/A673M, Frequency H.
2. The test results of full-size specimens shall meet an average value of 40 ft-lbf [54 J] at 70ºF [21 °C].

Maximum Carbon Equivalent
Grade 50 [345]: 0.38%
Grade 65 [450]: 0.43%
Grade 70 [485]: 0.45%

Tensile requirements

Grade	Yield point, min.	Tensile strength, min.	Elongation, min.	
	ksi [MPa]	ksi [MPa]	8 inch [200 mm], %	2 inch [50 mm], %
50 [345]	50 [345]	65 [450]	18	21
65 [450]	65 [450]	80 [550]	15	17
70 [485]	70 [485]	90 [620]	14	16
80 [550]	See page 7 for tensile requirements			

Supplementary requirements

S30. Charpy V-Notch (CVN) Impact Test for Structural Shapes: Alternate Core Location**
S30.1 For shapes with a flange thickness equal to or greater than 1-1/2 in. [38.1 mm] that are specified in the purchase order to be tested in accordance with this supplementary requirement, CVN impact tests shall be conducted in accordance with Specification A673/A673M, using specimens taken from the alternate core location. Unless otherwise specified in the purchase order, the minimum average absorbed energy for each test shall be 20 ft-lbf [27 J] and the test temperature shall be 70 °F [21 °C].

S75. Maximum Yield Point to Tensile Strength Ratio - Grade 50 [345].
S75.1 The maximum yield point shall be 65 ksi [450 MPa].
S75.2 The maximum yield to tensile ratio shall be 0.85.
S77. Reduced sulphur – Grade 65 [450]*
S77.1 The Grade 65 [450] shall be furnished with a maximum sulphur of 0.010 percent.
S77.2 The Grade 70 [485] shall be furnished with a maximum sulphur of 0.010 percent.

**extra costs may apply

ASTM A913 Grade 80

In 2019, ArcelorMittal introduced Grade 80 [550] high-strength, low-alloy, quenched-and-self-tempered (QST) steel for structural shapes to the ASTM A913 standard. Like its sister grades, ASTM A913 Grade 80 [550] is produced from 100% recycled scrap using an electric arc furnace and a thermomechanical rolling process combined with ArcelorMittal's in-line quenching and self-tempering (QST) treatment. The result is a material with a minimum yield strength of 80 ksi [550 MPa] and excellent ductility, toughness and weldability characteristics. Like other ASTM A913 grades, Grade 80 [550] sections are supplied with average Charpy V-notch (CVN) test values of 40 ft-lbf [54J] at 70°F [21°C] at the flange location. In addition, upon request, it is possible to obtain ASTM A913 Grade 80 [550] sections with CVN test values of 20 ft-lbf [27J] at 70°F [21°C] at the web-flange intersection. As proven in projects like Bay Adelaide North, Union Station Tower, and Natiivo, ASTM A913 Grade 80 [550] brings value to projects by improving structural efficiency, simplifying fabrication, and reducing project costs.

Chemical composition, maximum content in %

Grade	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Cb (Nb)	V	CE*
A913 Grade 80 [550]	0.16	1.80	0.030	0.030	0.50	0.45	0.25	0.25	0.07	0.06	0.1	0.49

* CE = C + Mn/6 + (Cr + Mo + V)/5 + (Cu + Ni)/15

Tensile

Grade	Yield point, ksi [MPa], min.	Tensile strength, ksi [MPa], min.	Elongation min 8 in. [200 mm], %	Elongation min 2 in. [50 mm], %
A913 Grade 80 [550]	80 [550]	95 [655]	13	15

Available section sizes (imperial)

Section	Foot weight (lb/ft)						
W44 x 16	408						
W40 x 16	655	593	503	431	397		
W40 x 12	392	331					
W27 x 14	539	368	336				
W24 x 12.75	370	335	306				
W18 x 11	311	283	258				
W14 x 16	550	500	455	426	398	370	342
W14 x 16	311	283	257	233	211	193	176
W12 x 12	230	210					

Available section sizes (metric)

Section	Mass per meter [kg/m]						
W1100 x 400	607						
W1000 x 400	976	883	748	642	591		
W1000 x 300	584	494					
W690 x 360	802	548	500				
W610 x 325	551	498	455				
W460 x 280	464	421	384				
W360 x 410	818	744	677	634	592	551	509
W360 x 410	463	421	382	347	314	287	262
W310 x 310	342	313					

Design and fabrication

As a result of the material's favorable mechanical properties, HISTAR® has received widespread approval by major structural design and fabrication codes throughout the world. This acceptance includes the incorporation of the ASTM A913 specification into the International Building Code; AISC's Steel Construction Manual (AISC 360) and Seismic Design Manual (AISC 341); CISC's Handbook of Steel Construction; and AWS's Structural Welding Code (AWS D1.1).

A913 Grade 65 sections used in transfer trusses

Strength

Available in yield strengths of up to 80 ksi [550 MPa], A913 steel has been an approved material specification by AISC since 1995. This acceptance was first reflected in the 1999 version of AISC 360. The material, at any yield strength, can be used in gravity designs with the same phi factors and design limits as any other material in the code.

For seismic design, AISC 341 Section A3.1 permits the use of A913 Grade 50 [345] in any part of the seismic force resisting system. When using A913 Grade 50 [345] in locations where inelastic behavior is expected, Supplementary Requirement S75 needs to be indicated in the purchase order. This requirement is made available at no additional cost.

AISC 341, Section A3.1 also permits the use of A913 Grades 65 [450] and 70 [485] in members where the steel is not expected to yield, e.g. column sections in strong-column, weak-beam applications. This allowance can lead to more efficient designs and cost savings for projects.

Weldability

With maximum carbon equivalent values less than or equal to 0.45 percent, A913 Grades 50 [345], 65 [450] and 70 [485] have inherently good weldability characteristics. Recognition of this benefit is reflected by acceptance of A913 into AWS D1.1. Preheat requirements for the material are summarized as follows:

AWS D1.1, Minimum preheat temperatures (prequalified)

Thickness, in. [mm]	Minimum preheat temperatures, °F [°C]		
	A913		
	Grade 50 [345]	Grade 65 [450]	Grade 70 [485]
1/8 to 3/4 incl. [3 to 20 incl.]	32 [0]*	32 [0]*	50 [10]
Over 3/4 to 1-1/2 incl. [Over 20 to 38 incl.]	32 [0]*	32 [0]*	150 [65]
Over 1-1/2 to 2-1/2 incl. [Over 38 to 65 incl.]	32 [0]*	32 [0]*	225 [110]
Over 2-1/2 [Over 65]	32 [0]*	32 [0]*	300 [150]

*Requires low hydrogen diffusible electrode, H8 or better. For metal at temperatures below 32°F [0°C], minimum preheat is 70°F [20°C].

When selecting welding consumables compatible with ASTM A913 grades, AWS D1.1 suggests E70, E80 and E90 electrodes be used when matching weld metal strength is required for Grades 50 [345], 65 [450] and 70 [485], respectively. In certain conditions, AWS D1.1 allows undermatching weld metal, please refer to the code for additional details.

Tests have demonstrated that preheat requirements for Grade 70 material up to 3.5 inches (80 mm) in thickness can be reduced to match AWS D1.1 guidelines for A913 Grades 50 and 65. In addition, though not presently prequalified, A913 Grade 80 steel has proven weldability through prior testing, both in the laboratory and at full scale. For more information on leveraging these benefits, please contact ArcelorMittal directly.

Toughness

For all grades and thicknesses of A913 steel, the minimum toughness is 40 ft-lbf [54 J] at 70°F [21°C] at the flange location. This is guaranteed at no extra cost to the end user and is included in the test results on the material test report. Upon agreement, ASTM A913 sections can be provided meeting a CVN requirement of 20 ft-lbf [27 J] at 70°F [21°C] at the alternate core location (web-flange intersection). This enables the material to meet the requirements of AISC 360 Section A3.1, which requires such CVN values for steel used in tensile applications and featuring flange thickness exceeding 2 in. (50 mm), as well as those of AISC 341 Section A3.3, which requires such values for steel used in seismic force resisting systems and featuring flange thicknesses exceeding 1-1/2 in. (38 mm).

Also, upon agreement, ASTM A913 steel can be supplied meeting CVN requirements down to -58°F [-50°C], a characteristic that is particularly attractive when the material is used in exposed, cold weather applications.

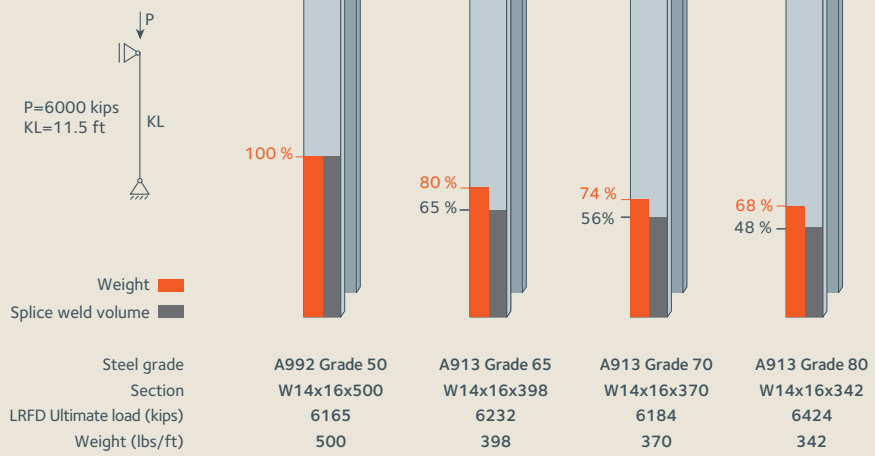
Extra value, same price

HISTAR® steel under the ASTM A913 specification is sold in the North American market without a premium over comparable steels (i.e. ASTM A992, A572 Grade 50 and CSA 40.21 350W). This means that users benefit from all the extra value HISTAR® has to offer - high strength, improved weldability and good toughness characteristics - for the same price they would pay for comparable materials.

Comparing A913 to other material

	A913				A992
	Grade 50 [345]	Grade 65 [450]	Grade 70 [485]	Grade 80 [550]	
Yield strength ksi [MPa]	50 [345]	65 [450]	70 [485]	80 [550]	50 [345]
Tensile strength, ksi [MPa]	65 [450]	80 [550]	90 [620]	95 [655]	65 [450]
Max. yield, ksi [MPa]	65 [450]*	No Max	No Max	No Max	65 [450]
Max yield to tensile ratio	0.85*	No Max	No Max	No Max	0.85
Min CVN: 40 ft-lbf [54 J] @ 70°F [21°C]	Yes	Yes	Yes	Yes	No
Max sulphur %	0.030	0.030	0.030	0.030	0.045
Max carbon %	0.12	0.12	0.12	0.16	0.23
Max CE %	0.38	0.43	0.45	0.49	0.47/0.45**
Weldability per AWS D1.1	Prequalified without preheat	Prequalified without preheat	Prequalified ▾	Under review ▾	Prequalified

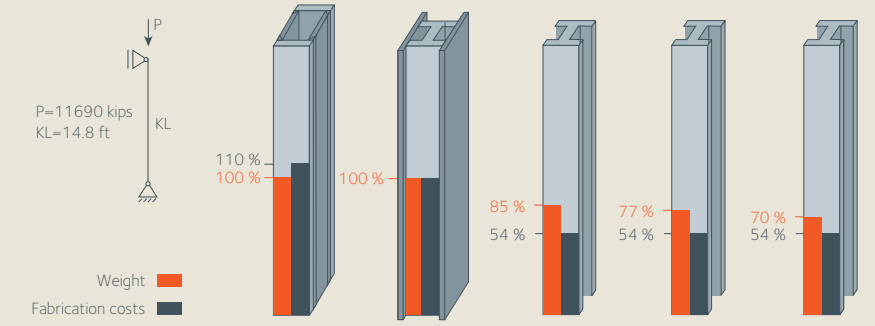
*S75 available upon request at no additional charge
**0.47% for section with flange thickness above 2 in. [50 mm], 0.45% for all other shapes.
▾ Weld test data available to inform development of qualified welding procedure specifications (WPS) in accordance with AWS D1.1 guidelines.



Steel grade	A992 Grade 50	A913 Grade 65	A913 Grade 70	A913 Grade 80
Section	W14x16x500	W14x16x398	W14x16x370	W14x16x342
LRFD Ultimate load (kips)	6165	6232	6184	6424
Weight (lbs/ft)	500	398	370	342

Figure 1: Using HISTAR® sections to reduce column weight

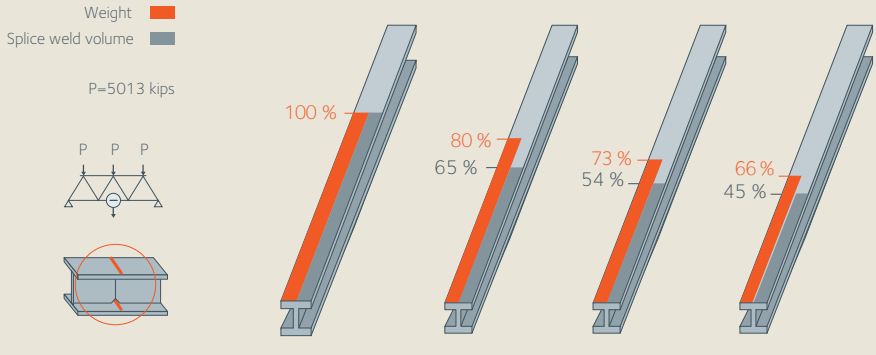
When compared to other structural steels, high-strength HISTAR® steel results in reduced weight and material costs of structures. HISTAR® also contributes to cost savings in welding, fabrication and erection.



Steel grade	A572 Grade 50	A992 Grade 50	A913 Grade 65	A913 Grade 70	A913 Grade 80
Section	Box column	W14x16x730 +plates	W14x16x808	W14x16x730	W14x16x665
LRFD Ultimate load (kips)	11828	11825	12241	11740	11870
Weight (lbs/ft)	950	949	808	730	665

Figure 2: Using HISTAR® sections to replace built-up columns

Employing high-strength HISTAR® steel enables designers to substitute complicated and expensive built-up sections with economical hot-rolled profiles.



Steel grade	A992 Grade 50	A913 Grade 65	A913 Grade 70	A913 Grade 80
Section	W14x16x426	W14x16x342	W14x16x311	W14x16x283
LRFD Ultimate load (kips)	5014	5252	5142	5331
Weight (lbs/ft)	426	342	311	283

Figure 3: Using HISTAR® sections to reduce weight of truss chord members

HISTAR® steel brings great benefit to the design of tension members in trusses. When used in these applications, the high-strength steel can not only lead to material cost savings but also to reduction of the dead load of the system. The weight savings result in the ability to use thinner, more efficient sections and ultimately to reduced fabrication costs.

HISTAR® frequently asked questions (FAQs)

How are HISTAR® and ASTM A913 material related?
HISTAR® is the trademark of ArcelorMittal's high-strength low-alloy steel shapes produced by a thermomechanical rolling process in combination with quenching and self-tempering. ASTM A913 is the product standard to which HISTAR® steel conforms in the ASTM specification.

What is the availability of A913 grades?
A913 shapes are available in Grades 50, 65, 70 and 80. Delivery time to North American ports is approximately 8 to 12 weeks after the material has rolled (add 2 weeks for West Coast ports). Popular shapes are generally rolled monthly.

Are ASTM A913 shapes available from North American stock locations?
Yes. ArcelorMittal carries ASTM A913 Grade 65 shapes in stock in North America. The sizes available are summarized below.

W14 x 16 x 145 – 873
W27 x 14 x 539
W36 x 16.5 x 231 – 925
W40 x 16 x 199, 277, 431-655

What shapes are available in HISTAR®/ASTM A913?
Available ASTM A6 shapes are indicated, in detail, in the ArcelorMittal rolling program (see page 16), a summary here:

W12 x 12 x 65 – 336
W14 x 14.5 x 90 – 132
W14 x 16 x 145 – 873
W18 x 11 x 76 - 311
W21 x 12.25 x 101 - 275
W24 x 9 x 84 – 103
W24 x 12.75 x 104 – 370
W27 x 10 x 102 – 129
W27 x 14 x 146 – 539*
W30 x 10.5 x 108 – 148
W30 x 15 x 173 – 391*
W33 x 11.5 x 130 – 169
W33 x 15.75 x 201– 387*
W36 x 12 x 150 – 387
W36 x 16.5 x 231 – 925
W40 x 12 x 167 – 392
W40 x 16 x 199 – 655
W44 x 16 x 230 – 408

Shapes in bold are most popular shapes.
* sizes rolled upon agreement.

If I order steel meeting the ASTM A913 specification, does the production process lengthen the lead time?
No. Shapes produced in A913 Grades 50, 65, 70 and 80 have the same availability as any other steel grades. The quenching and self-tempering process used to produce HISTAR®/ASTM A913 shapes is an in-line process, meaning the steel will not leave the production line to receive the treatment. As a result, it is an inherently efficient, performance-enhancing treatment method and will not affect the delivery time for the material.

What lengths are available for A913?
Standard shipping lengths are 30 to 60 feet and can be ordered in one-inch increments. Other lengths are available subject to agreement.

What are the design rules for columns, beams and connections in A913?
Internationally accepted for the design of steel structures, A913 is a referenced standard in the International Building Code; AISC's Steel Construction Manual (AISC 360) and Seismic Design Manual (AISC 341); and CISC's Handbook of Steel Construction, to name several design codes.

How does the toughness of A913 compare to other hot-rolled steel grades?
The thermomechanical rolling process in combination with in-line quenching and self-tempering results in a very fine grain material, showing a superior toughness when compared to other structural steels.

What Charpy V-Notch toughness requirements does A913 meet?
A minimum average CVN value of 40 ft-lbf at 70°F at the standard flange location is a general requirement of A913. Upon request, a minimum average CVN value of 20 ft-lbf at 70°F in the alternate core location (S30 per ASTM A6) is also available. In addition, A913 can be supplied with CVN values at temperatures as low as -58°F. Other tests temperatures and impact values are available upon agreement.

Where is it common to specify S30 per ASTM A6?
Note that ultimately, one must employ her/his own engineering judgement to understand when to invoke S30 per ASTM A6. However, as reference, per AISC 360, Section A3.1c, S30 is required for hot-rolled sections when the following condition occurs:

- Flange thickness exceeds 2 inches;
- Member is subject to primary tensile forces due to tension or flexure; and
- Member is spliced or connected using complete joint penetration groove welds fusing the thickness of the flange or the flange and web

In addition, per AISC 341, Section A3.3, in elements that are part of a seismic force resisting system (SFRS), S30 is required for hot-rolled sections when the member's flange thickness is equal to or greater than 1.5 inches.

Which shapes can be delivered according to S30 per ASTM A6?
The following shapes are available with CVN values of 20 ft-lbf at 70°F in the alternate core location (S30 per ASTM A6):

W12 x 12 x 170 – 230
W14 x 16 x 211 – 873
W18 x 11 x 76 - 311
W21 x 12.25 x 101 - 275
W24 x 12.75 x 207 – 370
W27 x 14 x 217 – 539
W30 x 15 x 235 – 391
W33 x 15.75 x 263– 387
W36 x 16.5 x 282 – 925
W40 x 12 x 235 – 392
W40 x 16 x 277 – 655
W44 x 16 x 290 - 408

For A913 Grade 50, what is the maximum YS and YS/TS ratio?
A913 Grade 50 is available with maximum yield strength (YS) of 65 ksi and maximum yield strength to tensile strength ratio (YS/TS) of 0.85, thereby making it comparable to A992 steel and an acceptable alternative for use in seismic applications as dissipative elements. This supplementary requirement, which must be specified at the time an order is placed is available at no additional cost and is identified as S75 per ASTM A913.

How ductile are A913 Grades 65 and 70?
Based on tension tests per ASTM A370, the minimum elongation values for A913 Grade 65 are 15 percent for an 8-inch specimen, respectively 17 percent for a 2-inch specimen. The minimum elongation values for A913 Grade 70 are 14 percent for an 8-inch specimen, respectively 16 percent for a 2-inch specimen. These elongation values, in combination with the favorable toughness characteristics of A913, have led to acceptance of these high-strength specifications in seismic design codes.

How can A913 be used in seismic applications?
Based on its favorable ductility and toughness characteristics, A913 steel is approved for use in AISC 341, per section A 3.1: "The specified minimum yield stress of structural steel to be used for members in which inelastic behavior is expected shall not exceed 50 ksi for systems defined in Chapters E, F, G and H, except that for systems defined in Sections E1, F1, G1, H1 and H4, this

limit shall not exceed 55 ksi.. Either of these specified minimum yield stress limits are permitted to be exceeded when the suitability of the material is determined by testing or other rational criteria. Exception: Specified minimum yield stress of structural steel shall not exceed 70 ksi for columns in systems defined in Sections E3, E4, G3, H1, H2 and H3 and for columns in all systems in Chapter F".

Can A913 be used in bridge applications?
HISTAR® has been used in bridges throughout Europe. In 2018, Grades QST 50, QST 50S, QST 65 and QST 70 were added to the AASHTO-approved ASTM A709 specification with the same chemical and manufacturing requirements as A913, and impact requirements as specified per A709.

How do residual stresses of A913 compare to other structural steels?
There will be little to no difference between the residual stresses of a particular shape in A913 and the same shape in a comparable specification.

How does the fire resistance of A913 compare to other steel grades?
Fire resistance of A913 is the same as that of other hot-rolled structural steel grades.

How does the corrosion resistance of A913 compare to other steel grades?
The corrosion resistance of A913 shapes is the same as for any other structural steel grades.

Can A913 be galvanized?
Yes. A913 is capable of forming a zinc layer during hot-dip galvanization. A913 is delivered with a silicon content ranging between 0.14% and 0.25% and is therefore suitable to be galvanized.

How do I weld A913 material?
A913 Grades 50, 65 and 70 are prequalified weldable materials per AWS D1.1. Designated as Category D materials, Grades 50 and 65 are weldable with minimal to no preheat when the product temperature is above 32°F and when using a low-hydrogen electrode (H8) – an advantage that is the result of the material's low Carbon Equivalent (CEv) values compared to other hot-rolled structural steel. Grade 70 requirements are specified in Category C. Tests have demonstrated that preheat requirements for Grade 70 material up to 2.6 inches in thickness can be reduced to match AWS D1.1 guidelines for A913 Grades 50 and 65. Test data is also available to guide the development of qualified welding procedure specifications (WPS) for Grade 80. For more information on leveraging these benefits, please contact ArcelorMittal directly.

...okay, if the conditions of a connection require preheating, is it acceptable to preheat A913 steel?
For all types of steel, complex and highly restrained conditions may require preheating. Oftentimes, this can be avoided by careful coordination of the weld sequencing; however, if the preheat cannot be avoided, no issues arise from preheating A913 steel.

What electrodes should be used when welding A913 material?
When selecting welding consumables compatible with A913 grades, it is suggested by AWS D1.1 that E70, E80 and E90 electrodes be used when matching weld metal strength is required for Grades 50, 65 and 70, respectively. In certain conditions, undermatching weld metal is permitted per AWS D1.1, please refer to the code for additional details.

Can A913 be welded in combination to other grades?
Yes. However, per AWS D1.1, the minimum preheat temperature applied to a joint composed of metals with different preheats is required to be the highest of the minimum preheats. Therefore, in connections with mixed metals (i.e. A913 steel combined with A992, A572, A36, etc.) preheat requirements of the other materials may control the welding procedure. Again, preheating the A913 has no detrimental effect.

Is thermal cutting of A913 shapes permitted?
Yes. A913 shapes can be cut with a torch or alternative thermal cutting tools using the same procedures as any other structural steel. According to AWS D1.1 and AISC 360 for shapes with flange thickness exceeding 2 inches, a minimum preheating of 150°F shall be applied prior to the procedure.

Can A913 steel shapes undergo flame straightening treatments?
Yes. As with any other structural steel it is possible to eliminate deformations or to give an A913 member a special shape by flame straightening. For local reheating of the entire material thickness, the maximum flame straightening temperature is 1200°F. For local superficial reheating of the surface only, the maximum flame straightening temperature is 1650°F.

Can stress relieving treatments be performed on A913 steel?
Stress relieving post-weld heat treatment (PWHT) may be necessary when the layout of the structure and/or the expected stress condition after welding requires a reduction of the residual stresses. If stress relieving is required, it should be performed in the same manner as for any structural steel grade. The temperature should range between 980°F and 1080°F. The holding time should be two minutes per mm (1/25") of material thickness, but not less than 30 minutes and not more than 90 minutes.

What can I expect when machining and cutting shapes in A913?
A913 can be machined and cut under the same conditions as grades with same level of tensile strength. Using higher strength steel enables the designer to reduce the size (thickness) of the material and therefore reduce machining times.

What are the environmental features of HISTAR®/ASTM A913?
Shapes in HISTAR®/ASTM A913 are 100% produced from steel scrap. After use or reuse, as for any other steel shapes, shapes in HISTAR® have a recovery rate of approximately 98% – according to European Commission Technical Steel Research – considering recycling and reuse of the material.

Is there a premium for ASTM A913 sections?
No. In North America, all the extra value of ASTM A913 steel – high yield strength (up to 80 ksi); outstanding toughness - (40 ft-lbf at 70°F, standard for all sections and strengths); and excellent weldability – is provided at the same price you would pay for 50 ksi material (A992, A572 Grade 50, CSA 40.21 350W).

Where can I find additional technical information on HISTAR®/A913 products?
Our specialists are ready to support your projects all over the world. For more information, please visit: **sections.arcelormittal.com**

Applications of HISTAR®

HISTAR®'s outstanding mechanical properties, coupled with its attractive price, enable it to bring value to various elements of a structure's design. Most frequently, high-strength HISTAR® profiles are used to reduce the weight of strength-governed structural elements, including those in gravity systems, long-span trusses, transfer trusses, outrigger systems, belt trusses, seismic force resisting systems and bridge girders. In addition to weight savings, use of HISTAR® can also positively impact fabrication, transportation, handling, and erection. In heavy shapes, for example, the welding time and costs are lowered as thinner members reduce the weld volume and, in many situations, the material can be welded without preheat, thereby leading to considerable savings of time and energy.

Typical applications of HISTAR® include:

Gravity columns

When design is not governed by drift or vibration issues, the use of HISTAR® Grades 65 [450], 70 [485], and 80 [550] in gravity columns with reasonable buckling lengths enables the engineer to reduce the weight and cost of their structures. The typical weight savings on a project that incorporates HISTAR® into gravity columns can exceed 10 percent of the weight of the entire structure.

Long-span trusses

In long-span trusses, HISTAR® Grades 65 [450], 70 [485], and 80 [550] bring the most value when used as tension members, such as the system's bottom chord, or in compression members with short buckling lengths. Employing high-strength HISTAR® steel in trusses can result in a weight reduction exceeding 25 percent compared to designs using only 50 ksi [345 MPa] steel. This reduction in weight is a function of the total span-length and the importance of dead loads on the design.

Seismic design

The use of HISTAR® steel allows the engineer to design a moment-frame structure with the economical "strong column – weak beam" concept. HISTAR® Grades 65 [450] and 70 [485] are permissible for use in column sections where the steel is not expected to yield. Coupled with 50 ksi [345 MPa] beam sections, this material enables the engineer to efficiently confine plastic hinging to the beam sections.

Bridge girders

When the design of a bridge is not governed by deflection, which is typically the case for those with light loads and/or short spans, the use of HISTAR® Grades 65 [450], 70 [485], and 80 [550] enables engineers to reduce the weight and the cost of the structure. In addition, the use of A913 Grades 50 [345] and 65 [450] make it possible for the fabricator to weld the steel without preheating (minimum 32 °F [0 °C] with low-hydrogen electrodes).


Bay-Adelaide Centre
Toronto, Canada
© EllisDon Construction Services Inc.

150 North Riverside,
Chicago, United States

Architect: Goettsch Partners; © TomRossiterPhotography

HISTAR® reference projects

Since its introduction in 1990, HISTAR® has been incorporated into the design and construction of more than 300 projects throughout the world. These projects range from supertall structures including One World Trade Center, The Bow, Shanghai World Financial Center, and Puerta Europa and long-span sports facilities such as Lucas Oil Stadium, Air Canada Centre, and Astana Arena, to aviation facilities, convention centers, industrial buildings, offshore platforms, car parks and bridges. A selection of commissions featuring HISTAR® includes:

High-rise
Atrio North Tower, Bogotá
111 Huntington, Boston
One Congress Street, Boston
Exchange South End, Boston
The Bow, Calgary
Eighth Avenue Place, East and West Towers, Calgary
Brookfield Place Tower One, Calgary
Broad J57, Changsha
150 North Riverside, Chicago
CNA Center, Chicago
300 North LaSalle, Chicago
NEMA Chicago, Chicago
Roosevelt University Academic, Student Life Resident Center, Chicago
Union Station Tower, Chicago
Emirates Tower 1, Dubai
VietinBank Business Center Office Tower, Hanoi
One London Place, London, ON
Puerta de Europa Torre I and Torre 2, Madrid
Torre de Cristal, Madrid
Torre Cepsa, Madrid
Brickell City Centre, Miami
Natiivo, Miami
4 Times Square, New York
425 Park Avenue, New York
Hearst Tower, New York
Hudson Yards, East Platform, New York
Manhattan West, One and Two, New York
The Spiral, New York
One World Trade Center, New York
World Trade Center, 3 and 4, New York
Shanghai World Financial Center, Shanghai
Poly Corporation Headquarters, Beijing
First Allied Plaza, San Diego
Russell Investments Center, Seattle
Rainier Square Tower, Seattle
Lakhta Center, St. Petersburg
160 Front, Toronto
CIBC Square I, Toronto
Bay Adelaide Centre, East, West and North Towers, Toronto
The One, Toronto

Hospitality and Entertainment
San Manuel Casino Resort Expansion, Highland, CA
The Cosmopolitan of Las Vegas, Las Vegas
The Palazzo Tower, Las Vegas

Aviation
Boeing 777 Assembly Building, Everett
Sabiha Gokcen Hangars, Istanbul
Mexico City Texcoco Airport, Mexico City
Newark Airport Terminal A, Newark

Healthcare
Simpson Querrey Biomedical Research Center, Chicago
Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago
Northwestern Medicine Prentice Women's Hospital, Chicago
Loma Linda University Medical Center, Loma Linda
Hackensack UMC, Second Street Pavilion, Hackensack
Kaiser Permanente Oakland Medical Center, Oakland
Intermountain Medical Center, Salt Lake City

U.S. Football Stadiums
AT&T Stadium, Arlington
Mercedes-Benz Stadium, Atlanta
State Farm Stadium, Glendale, AZ
NRG Stadium, Houston
Lucas Oil Stadium, Indianapolis
SoFi Stadium, Inglewood, CA
U.S. Bank Stadium, Minneapolis

Baseball stadiums
Globe Life Park, Arlington, TX
Marlins Park, Miami
American Family Field, Milwaukee
Chase Field, Phoenix
T-Mobile Park, Seattle

Arenas
Spectrum Center, Charlotte
T-Mobile Center, Kansas City
Chase Center, San Francisco
Fiserv Forum, Milwaukee
Canadian Tire Centre, Ottawa
Moda Center, Portland
Scotiabank Arena, Toronto
Rogers Arena, Vancouver, B.C.

Convention centers
McCormick Place Expansion, Chicago
The Huntington Convention Center of Cleveland, Cleveland
Reliance Jio BKC Convention Center, Mumbai
Phoenix Convention Center Expansion, Phoenix
Metro Toronto Convention Centre, Toronto
Walter E. Washington Convention Center, Washington, DC
Vancouver Convention Centre, West Building, Vancouver, BC.

Industrial
Nucor Steel Decatur, Decatur, AL
Glider Offshore, Gulf of Mexico
URSA Offshore, Gulf of Mexico
Diandong Power Station, Yunnan, China
Lanxi Power Station, Zhejiang, China
Tesla Gigafactory 1, Sparks, NV

Rolling Program (imperial)

"W" shape

Section	Footweight (lb/ft)															
W 44 x 16	408	368	335	290	262	230										
W 40 x 16	655	593	503	431	397	372	362	324	297	277	249	215	199			
W 40 x 12	392	331	327	294	278	264	235	211	183	167	149					
W 36 x 16.5	925	853	802	723	652	529	487	441	395	361	330	302	282	262	247	231
W 36 x 12	387	350	318	286	256	232	210	194	182	170	160	150	135			
W 33 x 15.75	387	354	318	291	263	241	221	201								
W 33 x 11.5	169	152	141	130	118											
W 30 x 15	391	357	326	292	261	235	211	191	173							
W 30 x 10.5	148	132	124	116	108	99	90									
W 27 x 14	539	368	336	307	281	258	235	217	194	178	161	146				
W 27 x 10	129	114	102	94	84											
W 24 x 12.75	370	335	306	279	250	229	207	192	176	162	146	131	117	104		
W 24 x 9	103	94	84	76	68											
W 24 x 7	62	55														
W 21 x 12.25	275	248	223	201	182	166	147	132	122	111	101					
W 21 x 8.25	93	83	73	68	62	55	48									
W 21 x 6.5	57	50	44													
W 18 x 11	311	283	258	234	211	192	175	158	143	130	119	106	97	86	76	
W 18 x 7.5	71	65	60	55	50											
W 18 x 6	46	40	35													
W 16 x 10.25	100	89	77	67												
W 16 x 7	57	50	45	40	36											
W 16 x 5.5	31	26														
W 14 x 16	1000	930	873	808	730	665	605	550	500	455	426	398	370	342	311	283
W 14 x 16	257	233	211	193	176	159	145									
W 14 x 14.5	132	120	109	99	90											
W 14 x 10	82	74	68	61												
W 14 x 8	53	48	43													
W 14 x 6.75	38	34	30													
W 14 x 5	26	22														
W 12 x 12	336	305	279	252	230	210										
W 12 x 12	190	170	152	136	120	106	96	87	79	72	65					
W 12 x 10	58	53														
W 12 x 8	50	45	40													
W 12 x 6.5	35	30	26													
W 12 x 4	22	19	16	14												
W 10 x 10	112	100	88	77	68	60	54	49								
W 10 x 8	45	39	33													
W 10 x 5.75	30	26	22													
W 10 x 4	19	17	15	12												
W 8 x 8	67	58	48	40	35	31										
W 8 x 6.5	28	24														
W 8 x 5.25	21	18														
W 8 x 4	15	13	10													
W 6 x 6	25	20	15													
W 6 x 4	16	12	9													
W 5 x 5	19	16														
W 4 x 4	13															

Sections available in ASTM A913 Grades 50 & 65

Sections available in ASTM A913 Grades 50, 65 & 70

Sections available in ASTM A913 Grades 50, 65, 70 & 80

"L" Shapes

Section	Thickness (in)				
L 12 x 12	1-3/8	1-1/4	1-1/8	1	
L 10 x 10	1-3/8	1-1/4	1-1/8	1	7/8
L 10 x 10	3/4				
L 8 x 8	1-1/8	1	7/8	3/4	
L 8 x 8	5/8	9/16	1/2		
L 6 x 6	1	7/8	3/4	5/8	9/16
L 6 x 6	1/2	7/16	3/8	5/16	
L 5 x 5	5/8	1/2	7/16	3/8	5/16
L 4 x 4	7/16	3/8	5/16		
L 3 x 3.5	3/8	5/16	1/4		
L 3 x 3	3/8	5/16	1/4		
L 2 x 2	1/4	3/16			

"S" Shapes

Section	Footweight (lb/ft)				
S 24	121	106	100	90	80
S 20	96	86	75	66	
S 18	70	54.7			
S 15	50	42.9			
S 12	50	40.8	35	31.8	
S 10	35	25.4			
S 8	23	18.4			
S 6	17.25	12.5			
S 5	10				
S 4	9.5	7.7			
S 3	7.5	5.7			

"MC" Shapes

Section	Footweight (lb/ft)				
MC 18	58	51.9	45.8	42.7	
MC 12	50	45	40	35	31
MC 10	41.1	33.6	28.5	25	22
MC 9	25.4	23.9			
MC 8	22.8	21.4	20	18.7	
MC 7	22.7	19.1			
MC 6	18	16.3	15.3		

"C" Shapes

Section	Footweight (lb/ft)		
C 15	33.9	40	50
C 12	30	25	20.7
C 10	25	20	15.3
C 8	13.75	11.5	

Subject to change without notice. For complete product information and other section ranges, please refer to ArcelorMittal Section and Merchant Bars sales program.

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